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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/917,400	07/27/2001	Henry A. Hill	11540-005001	2582

26161 7590 07/09/2003

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EXAMINER	
YAM, STEPHEN K	

ART UNIT	PAPER NUMBER
2878	

DATE MAILED: 07/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/917,400	HILL, HENRY A.
	Examiner	Art Unit
	Stephen Yam	2878

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Peri d f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 14 April 2003.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-45 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-21,23,25-31,33-35 and 37-45 is/are rejected.

7)☐ Claim(s) 22,24,32 and 36 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

This action is in response to Amendments and remarks filed on April 14, 2003. Claims 1-45 are currently pending.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 5, 6, 13, 15, 17-19, 29, 37, and 38 are rejected under 35 U.S.C. 102(b) as being anticipated by Roberts et al. US Patent No. 4,390,994.

Regarding Claim 1, Roberts et al. teach (see Fig.) a multiple source array, comprising a reflective mask (16) having an array of spatially separated apertures (18), at least one optic (12) positioned relative to the mask to form an optical cavity (see Col. 1, lines 66-68) with the mask, and a source ("pumping means"- see Col. 2, lines 3-5) providing electromagnetic radiation to the optical cavity to resonantly excite a mode supported by the optical cavity, wherein during operation, a portion of the electromagnetic radiation built-up in the cavity leaks through the mask apertures towards the object.

Regarding Claim 2, Roberts et al. teach (see Fig.) the excited mode having transverse dimensions (height of (14)) at the reflective mask that are larger than a transverse dimension of each aperture.

Regarding Claim 5, Roberts et al. teach (see Col. 3, lines 12-14) each aperture having a transverse dimension equal to the vacuum wavelength of the electromagnetic radiation provided by the source.

Regarding Claim 6, Roberts et al. teach (see Fig.) the apertures formed by holes in the reflective mask.

Regarding Claim 13, Roberts et al. teach the reflective mask comprising a reflective dielectric stack (see Col. 2, lines 24-31).

Regarding Claim 15, Roberts et al. teach (see Fig.) a dielectric material ("lasing medium") contacting the mask in the cavity.

Regarding Claim 17, Roberts et al. teach the optical cavity as a linear optical cavity (see Fig.).

Regarding Claim 18, Roberts et al. teaches the at least one optic comprising one optic and the linear optical cavity formed by two surfaces (see Fig.), the first surface (right side of (12)) defined by the optic and the second surface (left side of (16)) defined by the interface between the reflective mask and the dielectric material (see Fig. and Col. 1, line 66 to Col. 2, line 3).

Regarding Claim 19, Roberts et al. teach (see Fig.) the dielectric material filling the space between the two surfaces and the first surface defined by the interface between the optic and the dielectric material.

Regarding Claim 29, Roberts et al. teach the at least one optic positioned relative to the mask to form a stable optical cavity with the mask (see Col. 1, line 66 to Col. 2, line 3 and Col. 2, line 11-15).

Regarding Claim 37, Roberts et al. teach (see Fig.) a source comprising a reflective mask (16) having at least one aperture (18), and at least one optic (12) positioned relative to the mask to form a stable optical cavity (see Col. 1, lines 66-68) with the mask, wherein during operation a portion of electromagnetic energy built up in the cavity couples through the mask outwards (see Fig.).

Regarding Claim 38, Roberts et al. teach (see Fig.) a method for illumination, comprising resonantly exciting a mode of a stable optical cavity (see Col. 1, lines 66-68) and coupling electromagnetic radiation out of the optical cavity outwards through an array of apertures (18) in one of multiple optics (12, 16) that define the cavity, wherein the transverse dimensions of the excited mode are larger than a transverse dimension of each aperture (see Fig.).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 14 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts et al.

Regarding Claim 14, Roberts et al. teach the array in Claim 1, according to the appropriate paragraph above. Roberts et al. also teach the reflective dielectric stack as adjacent to the optical cavity (see Fig.). Roberts et al. do not teach an anti-reflection coating adjacent the object. It is well known in the art to surround a waveguide with an anti-reflection coating to

prevent reflected light from being scattered. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an anti-reflection coating in the array of Roberts et al., to retain light confinement for improved clarity of the emitted light beam.

Regarding Claims 21 and 23, Roberts et al. teach the array in Claim 1, according to the appropriate paragraph above. Roberts et al. do not teach the cavity as a folded cavity or a ring cavity with the components. It is design choice as to use any type of resonant cavity in an optical system, depending on the space requirements and the amount of desired resonance. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a folded cavity or a ring cavity for the optical cavity in the array of Roberts et al., to increase resonance to increase the light output.

5. Claims 3 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts et al. in view of Zumoto et al. US Patent No. 5,223,693.

Roberts et al. teach the array and method in Claims 1 and 38, according to the appropriate paragraph above. Roberts et al. do not teach the light having transverse dimensions larger (or more than 50 times larger) than the transverse dimension of each aperture. Zumoto et al. teach (see Fig. 10) a multiple source array for an object (205), comprising a reflective mask (221) having an array of spatially separated apertures (221b), at least one optic (222) positioned relative to the mask, and a source (providing (201)) providing electromagnetic radiation (201), wherein during operation, a portion of the electromagnetic radiation leaks through the mask apertures towards the object, wherein the width of the light (10mm x 30mm) (see Col. 6, lines 59-61) is more than 50 times larger than the transverse dimension of each aperture (20μm). It

would have been obvious to one of ordinary skill in the art at the time the invention was made to use the dimensions of Zumoto et al. in the array and method of Roberts et al., to sufficiently restrict the propagating beam width of light in order to provide more detailed illumination of an object.

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts et al. in view of Ebbesen et al. US Patent No. 5,973,316.

Roberts et al. teach the array in Claim 1, according to the appropriate paragraph above. Roberts et al. do not teach each aperture having a transverse dimension smaller than the vacuum wavelength of the electromagnetic radiation provided by the source. Ebbesen et al. teach (see Fig. 1) a reflective mask (10) with a plurality of spatially separated apertures (12) wherein each aperture has a transverse dimension smaller than the vacuum wavelength of the incident light. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use apertures having transverse dimension smaller than the vacuum wavelength of the incident light as taught by Ebbesen et al. in the array of Roberts et al., to filter particular wavelengths as taught by Ebbesen et al. (see Col. 3, lines 1-7) to improve the clarity of light incident on the object.

7. Claims 7-9, 11, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts et al. in view of Joannopoulos et al. US Patent No. 5,784,400.

Regarding Claim 7, Roberts et al. teach the array in Claim 1, according to the appropriate paragraph above. Roberts et al. do not teach the apertures formed by dielectric regions in the

reflective mask. Joannopoulos et al. teach an optical cavity with a reflective mask (502) (see Fig. 5) with the apertures formed by either holes (504) (see Fig. 5 and Col. 4, lines 39-41) or dielectric regions (604) (see Fig. 6 and Col. 4, lines 58-60). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the apertures by dielectric regions as taught by Joannopoulos et al. in the array of Roberts et al., to provide a filled waveguide to confine the light passing through each aperture to enhance light output.

Regarding Claim 8, Roberts et al. teach the array as taught in Claim 1, according to the appropriate paragraph above. Roberts do not teach each aperture comprising a dielectric region defining a waveguide having transverse dimensions sufficient to support a propagating mode of the electromagnetic radiation, wherein the waveguide couples the electromagnetic energy built-up in the cavity between opposite sides of the mask. Joannopoulos et al. teach an optical cavity with a reflective mask where each aperture comprises a dielectric region (604) (see Fig. 6) defining a waveguide having transverse dimensions sufficient to support a propagating mode of the electromagnetic radiation, wherein the waveguides couple the electromagnetic energy built-up in the cavity between opposite sides of the mask (see Col. 3, lines 57-61 and Col. 4, lines 45-47- total internal reflection (TIR) maintained through each waveguide). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a dielectric region defining a waveguide as taught by Joannopoulos et al. in the multiple source array of Roberts et al., to provide a filled waveguide to confine the light passing through each aperture to enhance light output.

Regarding Claims 9 and 11, Roberts et al. in view of Joannopoulos et al. teach the array as taught in Claim 8, according to the appropriate paragraph above. Roberts et al. also teach (see

Fig.) the reflective mask further comprising an end mask portion (right end of (20)) adjacent the object. Regarding Claim 11, Roberts et al. teach the reflective mask comprising a reflective dielectric stack (see Col. 2, lines 24-31) and the end mask portion comprising a metal layer (see Col. 2, line 28). Roberts et al. do not teach a secondary aperture formed in the end mask portion and aligned with the waveguide, wherein the secondary aperture has a transverse dimension smaller than the transverse dimension of a corresponding waveguide. Joannopoulos et al. teach (see Fig. 5) an end mask portion ((502), also bottom block of Fig. 6) with each aperture has a secondary aperture formed in the end mask portion and aligned with the corresponding waveguide. In addition, it is well known in the art to use a smaller aperture to confine emitted light, so that a precise narrow beam of light is used to excite a particular area of a sample. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a secondary aperture as taught by Joannopoulos et al. wherein the second aperture is smaller than the waveguide in the device of Roberts et al. in view of Joannopoulos et al., to further confine the light to narrow the width of the emitted light beam.

Regarding Claim 12, Roberts et al. in view of Joannopoulos teach the multiple source array as taught in Claim 8, according to the appropriate paragraph above. Roberts et al. and Joannopoulos do not teach the waveguide defining a second optical cavity resonant with the propagating mode of electromagnetic radiation. It is well known in the art to use multiple optical cavities to obtain a higher optical power through a greater amount of total resonance. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the waveguide for a second optical cavity in the array of Roberts et al. in view of Joannopoulos, to provide greater output optical power without significantly increasing the beam width.

8. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts et al. in view of Joannopoulos as applied to Claim 9, further in view of Ebbesen et al. US Patent No. 5,973,316.

Roberts et al. in view of Joannopoulos teach the array in Claim 9, according to the appropriate paragraph above. Roberts et al. do not teach the secondary aperture having a transverse dimension smaller than the vacuum wavelength of the electromagnetic radiation provided by the source. Ebbesen et al. teach (see Fig. 1) a reflective mask (10) with a plurality of spatially separated apertures (12) wherein each aperture has a transverse dimension smaller than the vacuum wavelength of the incident light. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use secondary apertures having transverse dimension smaller than the vacuum wavelength of the incident light as taught by Ebbesen et al. in the array of Roberts et al., to filter particular wavelengths as taught by Ebbesen et al. (see Col. 3, lines 1-7) to improve the clarity of light incident on the object.

9. Claims 16 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts et al. in view of Ueyanagi et al. European Patent Application EP 0,944,049.

Regarding Claim 16, Roberts et al. teach the array in Claim 15, according to the appropriate paragraph above. Roberts et al. do not teach the dielectric material as an Amici lens. Ueyanagi et al. teach (see Fig. 15) a multiple source array comprising a reflective mask (6b,7) having an array of spatially separated apertures (aperture within (6b) above (7a)), at least one optic (5, 6a) positioned relative to the mask, and a source (2) providing electromagnetic radiation

to leak (see Paragraph 0039) radiation through the mask apertures towards an object (12), also comprising a dielectric material (6a) (see Fig. 2 and 15 and Paragraph 0027) contacting the mask wherein the dielectric material is a lens. It is design choice as to what type of lens is used in an optical system, to refract the light as desired. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a lens as taught by Ueyanagi et al. as an Amici lens in the array of Roberts et al., to provide the laser source externally in order to reduce the size of the array and to provide optimum light output for such an array system.

Regarding Claim 20, Roberts et al. teach the array in Claim 19, according to the appropriate paragraph above. Roberts et al. do not teach the optic as a lens. Ueyanagi et al. teach (see Fig. 15) a multiple source array comprising a reflective mask (6b,7) having an array of spatially separated apertures (aperture within (6b) above (7a)), at least one optic (5, 6a) positioned relative to the mask, and a source (2) providing electromagnetic radiation to leak (see Paragraph 0039) radiation through the mask apertures towards an object (12), wherein the optic is a lens (see Fig. 15 and Paragraph 0024). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a lens as the optic as taught by Ueyanagi et al. in the array of Roberts et al., to provide the laser source externally in order to reduce the size of the array.

10. Claims 25, 26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts et al. in view of Mongeon et al. US Patent No. 4,592,058.

Regarding Claim 25, Roberts et al. teach the array in Claim 1, according to the appropriate paragraph above. Roberts et al. do not teach an active feedback system for

maintaining the resonance between the optical cavity and the electromagnetic radiation provided by the source. Mongeon et al. teach (see Fig. 1) an active feedback system for an optical cavity (5, 7) comprising an active feedback system (9, 11, 15, 17, 19, 21, 23) for maintaining the resonance in the optical cavity and the electromagnetic radiation provided by the source (3). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an active feedback system as taught by Mongeon et al. in the array of Roberts et al., to negate the effects of temperature changes on the resonance effects of the optical cavity as taught by Mongeon et al. (see Col. 2, lines 55-59).

Regarding Claim 26, Roberts et al. and Mongeon et al. teach the array n Claim 25, according to the appropriate paragraph above. Roberts et al. do not teach an electronic controller to change the wavelength of the electromagnetic radiation. Mongeon et al. teach the active feedback system comprising an electronic controller (23) that causes the source to change the wavelength of the electromagnetic radiation in response to a servo signal (33) derived from a portion of the electromagnetic radiation (into (15)) reflected from the optical cavity. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an electronic controller as taught by Mongeon et al. in the array of Roberts et al., to negate the effects of temperature changes on the resonance effects of the optical cavity as taught by Mongeon et al. (see Col. 2, lines 55-59).

Regarding Claim 28, Roberts et al. and Mongeon et al. teach the array in Claim 25, according to the appropriate paragraph above. Roberts et al. do not teach a transducer to dither a coupled optic. Mongeon et al. teach the active feedback system comprising an transducer (9) coupled to one of the optics (7) that form the optical cavity and an electronic controller (23) that

causes the transducer to dither (see Col. 2, lines 30-46) the coupled optic in response to a servo signal (33) derived from a portion of the electromagnetic radiation (into (15)) reflected from the optical cavity. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a transducer and electronic controller as taught by Mongeon et al. in the array of Roberts et al., to provide an easily-constructed component of compensating for the effects of temperature changes on the resonance effects of the optical cavity as taught by Mongeon et al. (see Col. 2, lines 55-59).

11. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts et al. in view of Mongeon et al. as applied to Claim 25, further in view of Palmer US Patent No. 6,201,820.

Roberts et al. and Mongeon et al. teach the array in Claim 25, according to the appropriate paragraph above. Roberts et al. also teach (see Fig.) a dielectric material ("lasing medium") at least partially filling the optical cavity. Roberts et al. and Mongeon do not teach a temperature controller and electronic controller to change the temperature of the dielectric material. Palmer teaches a laser with an optical cavity (see Col. 7, lines 3-6) with an active feedback system comprising a temperature controller (20) (see Fig. 1) coupled to the optical cavity and an electronic controller (18) that causes the temperature controller to change the temperature of the optical cavity in response to a servo signal (see Col. 2, lines 35-47) derived from the electromagnetic radiation reflected (into (28) and (30)) from the optical cavity. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the temperature controller and electronic controller of Palmer in the multiple source array of

Roberts et al. in view of Mongeon et al., to provide a durable method of maintaining a stable resonant frequency and a constant optical cavity length without fragile, moving parts.

12. Claims 30, 31, 33-35, and 40-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts et al. in view of Krantz US Patent No. 6,248,988.

Regarding Claim 30, 40, and 41, Roberts et al. teach the array and method in Claims 1 and 38, according to the appropriate paragraph above. Roberts et al. do not teach a microscopy system or method also comprising a multi-element photo-detector and an imaging system to return electromagnetic radiation leaked to the object and scattered/reflected back through the apertures. Krantz teaches (see Fig. 15) a microscopy system comprising a source (235), multi-element photo-detector (244,252), aperture array (239) (see Col. 13, lines 40-42), and imaging system (243, 251) positioned to direct a return beam to the multi-element detector, wherein the return beam comprises electromagnetic radiation leaked to the object (250) and scattered/reflected back through apertures (244',252'). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the multi-element photo-detector and imaging system of Krantz with the multiple source array and method of Roberts et al., to provide a narrow-beam light source to provide a higher precision of microscopy scanning.

Regarding Claims 31 and 42, Roberts et al. in view of Krantz teach the microscopy system and method in Claims 30 and 41, according to the appropriate paragraph above. Roberts et al. do not teach a pinhole array positioned adjacent a multi-element photo-detector. Krantz also teaches a pinhole array (244',252') adjacent the multi-element photo-detector (see Col. 13, lines 33-37) and the multi-element photo-detector comprising multiple detector elements (see

Fig. 15), wherein each pinhole is aligned with a separate set of one or more detector elements. It is also well known in the art to split a light beam and align each beam to a specific detector element in the multi-element photo-detector, to distinctly capture the image of a sample. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the pinhole array of Krantz in the microscopy system and method of Roberts et al. in view of Krantz, to independently capture the data from each light beam to effectively form a clear microscope image.

Regarding Claims 33 and 43, Roberts et al. teach the multiple source array and method in Claims 1 and 40, according to the appropriate paragraph above. Regarding Claim 33, Roberts et al. do not teach a microscopy system or method also comprising a multiple detector array, a multi-element photo-detector, and an imaging system to return electromagnetic radiation leaked to the object and scattered/reflected back through the apertures. Regarding Claim 43, Roberts et al. do not teach the object passing through a second array of apertures Krantz teaches (see Fig. 15) a microscopy system comprising a source (235), multiple detector array ("second array of apertures" for Claim 43) (244',252') comprising an array of spatially separated apertures (see Col. 13, lines 33-37), multi-element photo-detector (244,252), aperture array (239) (see Col. 13, lines 40-42), and imaging system (243,251) positioned to direct a return beam to the multi-element detector, wherein the return beam comprises electromagnetic radiation leaked to the object (250) and passing through the detector array. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the multi-element photo-detector and imaging system of Krantz with the multiple source array and method of Roberts et al., to provide a narrow-beam light source to provide a higher precision of microscopy scanning.

Regarding Claim 34, Roberts et al. in view of Krantz teach the microscopy system in Claim 33, according to the appropriate paragraph above. Roberts et al. and Kranz do not teach aligning apertures of the source array with the apertures of the detector array. It is well known in the art to split a light beam and align each beam to a specific detector element in the multi-element photo-detector, to distinctly capture the image of a sample. It would have been obvious to one of ordinary skill in the art at the time the invention was made to align the apertures of the source and detector arrays in the microscopy system of Roberts et al. in view of Krantz, to effectively focus the light for optimal contrast and detection imaging.

Regarding Claims 35 and 44, Roberts et al. in view of Krantz teach the microscopy system and method in Claims 33 and 43, according to the appropriate paragraph above. Roberts et al. do not teach a pinhole array positioned adjacent a multi-element photo-detector. Krantz also teaches a pinhole array (244',252') adjacent the multi-element photo-detector (see Col. 13, lines 33-37) and the multi-element photo-detector comprising multiple detector elements (see Fig. 15), wherein each pinhole is aligned with a separate set of one or more detector elements. It is also well known in the art to split a light beam and align each beam to a specific detector element in the multi-element photo-detector, to distinctly capture the image of a sample. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the pinhole array of Krantz in the microscopy system and method of Roberts et al. in view of Krantz, to independently capture the data from each light beam to effectively form a clear microscope image.

13. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts et al. in view of Krantz as applied to Claim 40, further in view of Balasubramanian US Patent No. 4,340,306.

Roberts et al. in view of Krantz teach the method in Claim 40, according to the appropriate paragraph above. Roberts et al. and Krantz do not teach interfering the imaged electromagnetic radiation with reference electromagnetic radiation at the multi-element photo-dtector, where the two radiations are from a common source. Balasubramanian teaches a microscopy system with an interferometer which separates the source into a measurement beam and a reference beam (see Col. 3, lines 21-24) and combined with the signal beam to interfere (see Col. 3, lines 24-30) at a multi-element photo-detector (25) (see Fig. 1 and Col. 3, lines 30-34), wherein the two beams are derived from a common source (13). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the interferometer as taught by Balasubramanian in the method of Roberts et al. in view of Krantz, to provide accurate scanning of non-regular reflective surfaces (see Col. 3, lines 55-61).

Allowable Subject Matter

14. Claims 22, 24, 32, and 36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

15. The following is a statement of reasons for the indication of allowable subject matter:

Regarding Claim 22, the array as claimed, specifically in combination with a folded optical cavity wherein the first and second surfaces define the end surfaces for the folded optical cavity, is not disclosed or made obvious by the prior art of record.

Regarding Claim 24, the array as claimed, specifically in combination with a ring cavity containing two optics in the at least one optic and formed by three surfaces including the two optics and the interface between the reflective mask and dielectric material, is not disclosed or made obvious by the prior art of record.

Regarding Claims 32 and 36, the microscopy system as claimed, specifically in combination with an interferometer which separates the electromagnetic radiation into a measurement beam and reference beam and combines it with a return beam to interfere at the multi-element photo-detector, is not disclosed or made obvious by the prior art of record.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen Yam whose telephone number is (703)306-3441. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (703)308-4852. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7724 for regular communications and (703)308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

SY

SY
June 30, 2003

DAVID PORTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800